EUROPEAN SCHOOL OF ANTENNAS

MICROWAVE IMAGING AND DIAGNOSTICS: THEORY, TECHNIQUES AND APPLICATIONS

February 27- March 3, 2023 Napoli, Italy

Coordinators

Dr. L. Crocco, IREA-CNR (IT)

Prof. T. Isernia, Università Mediterranea di Reggio Calabria (IT)

Prof. A. Massa, Università di Trento (IT)

Lecturers

Dr. I. Catapano, IREA-CNR (IT)

Dr. Panagiotis Kosmas, Meta Materials Inc. (GR)

Prof. Joe Lo Vetri, University of Manitoba (CA)

Dr. R. Palmeri, IREA-CNR (IT)

Dr. M. Salucci , Università di Trento (IT)

Dr. R. Scapaticci, IREA-CNR (IT)

The exploitation of electromagnetic field data as a sensing tool paves the way to a number of interesting engineering applications: antenna testing and characterization, biomedical diagnostics, humanitarian demining, archeological prospection, through-the-wall imaging, non-destructive testing of transport infrastructures and buildings, and many others.

This course, after reviewing fundamental equations and main difficulties of inverse problems, will focus on classical and recently introduced solution procedures and algorithms, discussing capabilities, limitations, and perspectives of both approximate and 'exact' solution methods. The novel paradigm of machine-learning as applied to microwave imaging will be also presented along with other emerging topics.

The developed concepts will be corroborated with focused lectures, interactive tutorials and in-field activities providing practical examples of the broad spectrum of applications of electromagnetic inverse problems.

The course is primarily conceived for Doctoral students and researchers with an engineering or physics background.

Course location:

School of Polytechnic and Basic Sciences - College of Engineering - Federico II University, Napoli, Italy

Registration fee:

550€ universities and non-profit; 1100€ for business companies

Grants for selected PhD candidates

Credits: PhD students 3 ECTS

For registration and details:

http://esoa-mwi2023.irea.cnr.it/

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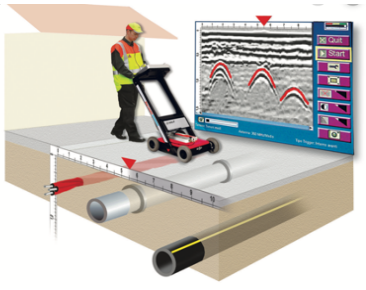

Fundamentals of Inverse Source and Inverse Scattering	• Introduction to inverse EM problems • Mathematical issues of inverse source and inverse scattering problems • Fundamental Properties of Radiated and Scattered Fields
Microwave Tomography Methods and Approaches	• Imaging methods based on linear approximations • Qualitative Imaging Methods • Compressive Sensing in Inverse Scattering • Inverse Scattering Numerical Formulations and Optimization-based Solutions
Emerging Topics	• Machine Learning based approaches for inverse scattering • Physics-Assisted Machine Learning for Solving Inverse Scattering Problems and Emerging Trends
Electromagnetic Imaging in action	• Microwave tomography for subsurface sensing, security and cultural heritage • Metasurface-enhanced antennas - A possible way to improve data quality for microwave detection and imaging • Microwave Imaging in Biomedical & industrial applications • From Data-Acquisition to Imaging: the case of Stored-Grain and Multi-modal Breast Imaging
Practical activities	• Solving linearized inverse source and inverse scattering problems • Qualitative imaging and compressive sensing inspired imaging • On-field activity: ground penetrating radar